THE ACCESSIBILITY ANALYSIS OF COVID-19 REFERRAL HOSPITALS TO THE LOCATION OF FUNDAMENTAL STUDENT

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ABSTRACT

The Covid-19 pandemic that occurred in all parts of the world has had an impact on the various sectors. Not only in the economic sector but also in the educational sector. Until Month June Year 2020, the Indonesian government had carried out a new-normal policy. The purpose of the study was to analyze the affordability of the Covid-19 referral hospital to the position of students during the new-normal era. The affordability could be observed by the distance traveled by students to the nearest Covid-19 referral hospital. This study used the OD matrix layer from ArcMap 10.3. The sample used in this study was 87 students with 11 Covid-19 referral hospitals in East Nusa Tenggara Province. Based on the research results in the form of maps produced, showed that from 87 students observed, only 59 or 67.82% could reach the Covid-19 referral hospitals. Meanwhile, the other 28 students or 32.18% couldn't be reached by the hospitals. The amount of students observed, located less than 15 km from the Covid-19 referral hospitals were 35 or 40.22% from the total of 87 students. The hospital which students refer to based on their location was the WZ. Yohanes hospital.

Keywords: Covid-19; OD Matrix Layers; Referral Hospital

A. INTRODUCTION

Covid-19 is a problem experienced by most countries in the world. Corona virus disease 19 (Covid-19) has developed into a catastrophic pandemic with over millions of confirmed cases worldwide (Glass et al., 2020). Between January and April 2020, the epidemic turned into a global pandemic from its origin center in Wuhan, China, reaching most countries around the world (Dryhurst et al., 2020). Covid-19 pandemic has spread fast almost all countries in the world including Indonesia (Syuhada et al., 2021). The cases Covid-19 in Indonesia until the date of 30

September 2020 confirmed were 291,000 cases, with a mortality rate of 10,856 cases (BNPB, 2020). This shows the mortality rate in Covid-19 cases in Indonesia is 3.73%. East Nusa Tenggara Province, one of the provinces in Indonesia, impacted from the Covid-19 pandemic. Until the date of September 30th, Year 2020, there were 424 cases of Covid-19 in the Province of East Nusa Tenggara. The confirmed Covid-19 cases in each district in the Province of East Nusa Tenggara has difference in amount. This amount can be seen in the following table.

Table 1. Number of Covid-19 Cases in Each Regency in East Nusa Tenggara Province
Until September 30, 2020

District	Cases
Ende	212
Kota Kupang	160
Manggarai Barat	122
Sikka	102
Manggarai	54
Sumba Barat	52
Sumba Timur	42
Kabupaten Kupang	30
Flores Timor	22
Nagekeo	18
Timor Tengah Selatan	18
Sumba Barat Daya	10
Rote Ndao	4
Alor, Lembata, Malaka, Manggarai Timur, Sumba Tengah, dan Timor Tengah Utara	2

Source: (Satgas Covid-19 NTT, 2020)

Based on table 1, the district with the highest Covid-19 cases until September 30th, Year 2020, in East Nusa Tenggara Province is Ende Regency with 212 cases, and then followed by Kota Kupang with 160 cases. Meanwhile, districts with the lowest number of the case observed in Alor District, Lembata District, Malaka District, East Manggarai District, Central Sumba District, and North Central Timor District with 2 cases each respectively.

Covid-19 disease in the worst cases leads to severe manifestations such as acute respiratory distress syndrome (ARDS), multi-organ failure, and mortality because manifestations can be caused by a hyperactive and misguided immune response (Maucourant et al., 2020). Symptoms such as fever or cough, and signs such as oxygen saturation or lung auscultation findings, are the first diagnostic information regarding this disease, further diagnostic testing used from this information (Emperador et al., 2020). Further testing used a swab test to find out viral RNA using a sample usually obtained from the respiratory tract with a nasopharyngeal swab (Watson, n.d.).

The Covid-19 pandemic has also rocked the education sector, and this fear is likely to reverberate across the education sector globally by forcing many schools and colleges to temporarily closed (Dhawan, 2020). As a step to protect school residents from exposure to Covid-19, various regions have established learning from home policies (Arifa, 2020). It also causes Nusa Cendana University rectors to issue a policy to implement online learning

activities. Online learning carried out by students, currently causes many students to return to their respective home. The high level of confirmed cases Covid-19 in the Province of East Nusa Tenggara with the level of different cases in each country provides its anxiety for students. Meanwhile, the Covid-19 referral hospital available in East Nusa Tenggara Province is only 11 hospitals. The level of coverage of the Covid-19 referral hospital that has been determined by the government certainly helps students who are return to their respective hometowns. However, the geographic condition of East Nusa Tenggara Province, which is mostly in the form of islands, certainly poses a challenge to the affordability of the hospitals to the current student positions. This study aims to determine the affordability of the Covid-19 referral hospital to student locations and to observe the mileage of students to the location of the nearest hospital.

B. MATERIALS AND METHODS

This research is descriptive quantitative research. The research is located in East Nusa Tenggara Province. The population used is the Geography Education Form 3A 2019 data with a total of 671 students. For sampling, the Slovin formula (Purwanto; et al., 2019) was used:

$$n = \frac{n}{1 + (n \, x \, e^2)}$$

Based on the calculation, the amount sample acquired was 87 students out of 671 in total. Data were collected in this study through a questionnaire posted online by using Kobotoolbox. The researcher sent a link contains questionnaire to each respondent to be filled out as a feed back to the questionnaire. The OD Matrix Layer analysis was used to analyze the parameters which had already collected. OD Matrix is the core data and prerequisite for traffic planning and management (Lu et al., 2016). The OD method is used for cases where the supply pattern in terms of velocity and current is available (Krishnakumari et al., 2020). The parameters used in conducting the OD Matrix Layer were the main road, the Covid-19 referral hospital, and the location of the student. To identify the main obstacle to hospital affordability and its solution, questionnaires were distributed among students.

C. RESULTS AND DISCUSSION

Before doing the OD Matrix Layer analysis, it is necessary to know the location of the student, the location of the referral hospital, and the road network.

Student Location

The location is known when students filled out the questionnaire on the link that had already given by the researchers, thus known as the distribution location.

Furthermore, cluster analysis was used to determine the distribution pattern. The distribution of the student locations presented in the following map:
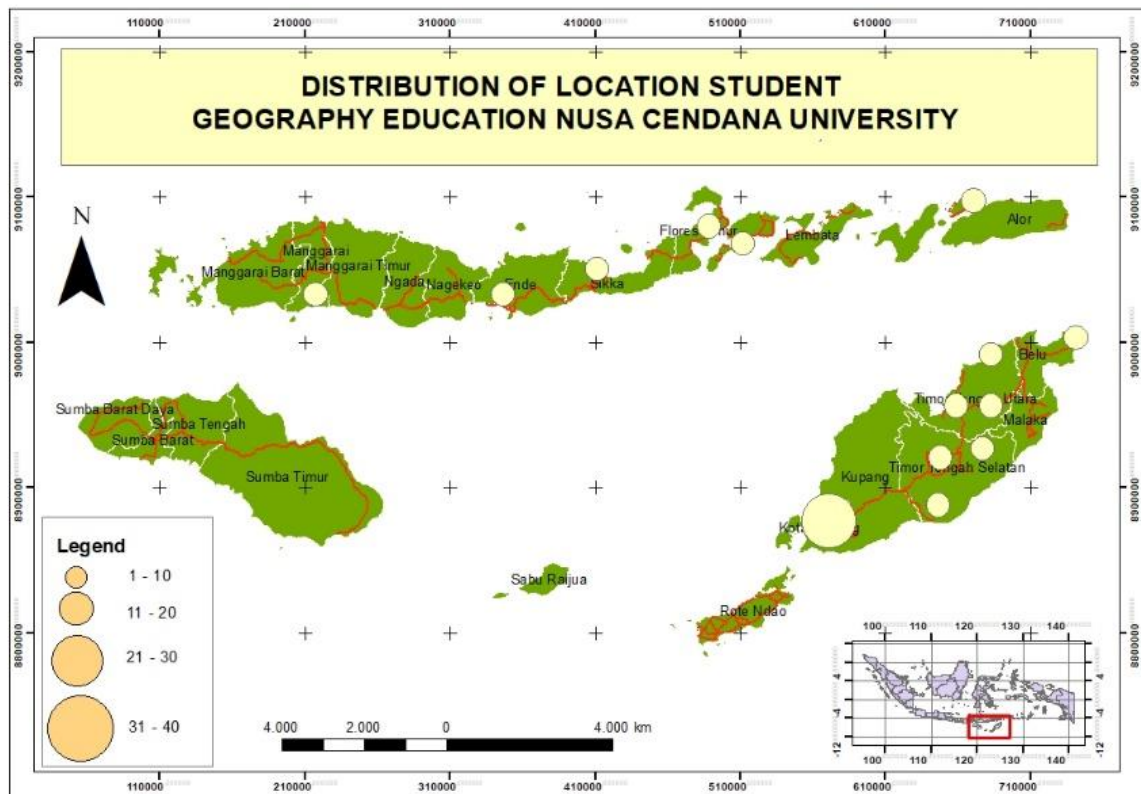

Figure 1. Distribution of Location Students

Figure 1 showed that most students were located in Kupang City and Kupang Regency. Some other students scattered in other districts.

The Covid-19 Referral Hospital

List of names and addresses of the referral hospitals were obtained from the Covid-19 Task Force in East Nusa Tenggara Province. Based on the data from the East Nusa Tenggara Province Covid-19 Task Force in 2020, it is known that there are 11 Covid-19 referral hospitals in East Nusa Tenggara Province. The list of names of referral hospitals are shown below:

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Table 2. List Name and Adress Covid-19 Referral Hospital in East Nusa Tenggara Province

No	Name	Adress
1	RSUD WZ. Yohanes Kupang	Jl. Moch Hatta No.19, Oetete, Kec. Oebobo, Kota Kupang
2	RSUD T.C. Hillers Maumere	Jl. Wairklau No.1, 86113, Kota Uneng, Alok, Kabupaten Sikka
3	RSUD Komodo, Labuan Bajo	Jl. Raya Labuan Bajo-Ruteng, Golo Bilas, Komodo, Kabupaten Manggarai Barat
4	RSUD Gabriel Manek, Belu	Tenukiik, Berdao, Atambua Bar., Kabupaten Belu
5	RSUD Alor	Jl. Dr Sutomo No 8 Kalabahi Teluk Mutiara Alor, Kalabahi Kota, Teluk Mutiara, Alor Regency
6	RSUD Ba'a Rote Ndao	Jl. BA'A Busalangga, Mokdale, Lobalain, Kabupaten Rote
7	RSUD Sabu Raijua	Menia, Sabu Bar., Kabupaten Sabu Raijua
8	RSUD Lewoleba, Lembata	Lewoleba Tim., Nubatukan, Kabupaten Lembata
9	RSUD Ende	Jalan Prof. Dr. W.Z Yohanes, Kel. Paupire, Ende Tengah, Kabupaten Ende
10	RSUD Umbu Rara Meha Waingapu	Jl. Ikan Kombong, Kambajawa, Kota Waingapu, Kabupaten Sumba Timur
11	RSUD Waikabubak Sumba Barat	Dira Tana,, Soba Wawi, Loli, Kabupaten Sumba Barat

Source: Satgas Covid-19 East Nusa Tenggara Province, 2020

In Table 2, from 22 districts in East Nusa Tenggara, there were only 11 Covid-19 referral hospitals in the province of East Nusa Tenggara. From this data, the coordinate then could be recorded. After made in the form of a map, the results are as follows:
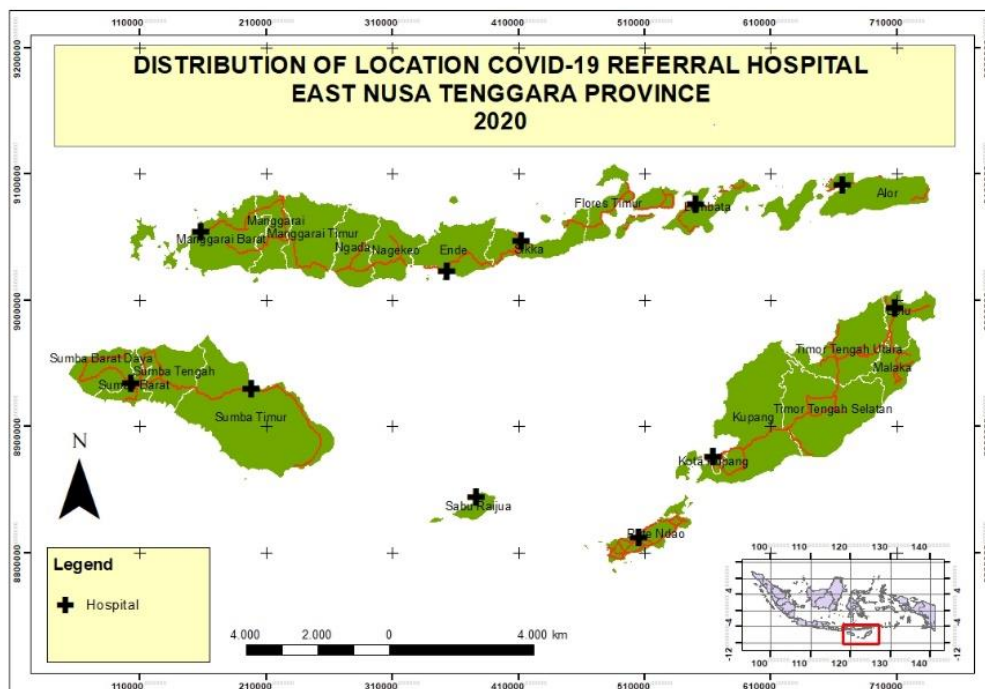

Figure 2. Distribution of Location for Covid-19 Referral Hospital

Figure 2 showed the known location of the Covid-19 referral hospital which located only in Sikka District, Kupang City, West Manggarai District, Belu District, Alor District, Rote District, Sabu Raijua District, Lembata District, Ende District, East Sumba District, and West Sumba District. Meanwhile, 11 other districts in East Nusa Tenggara Province did not have Covid-19 referral hospitals.

Student Coverage of Covid-19 Referral Hospitals

To find out the affordability of the students to the nearest hospital OD Matrix Layer analysis was used. So that if any students suffers from Covid-19, the students could handle it immediately. First of all, it is necessary to know the road network in East Nusa Tenggara Province. The road network map in East Nusa Tenggara Province was obtained from Google Earth 2020 then carried out by delineation. The following is a road network map of the location of Covid-19 referral students and hospitals:
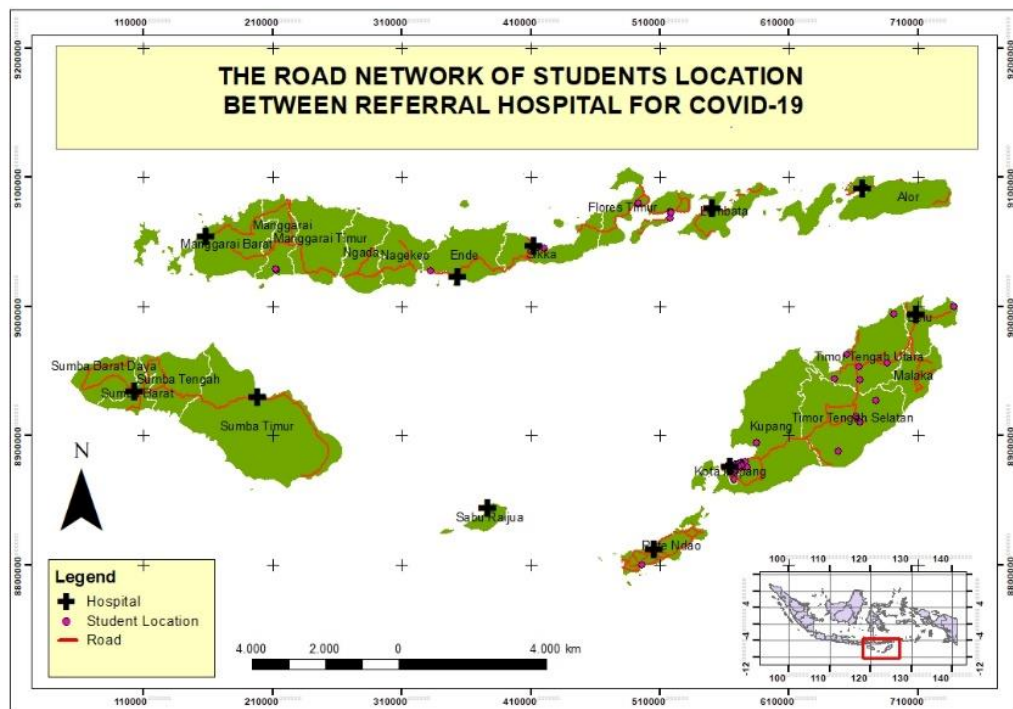

Figure 3. The Road Network

After that, analysis by using the OD Matrix Layer analysis was conducted. From the results of the analysis a map

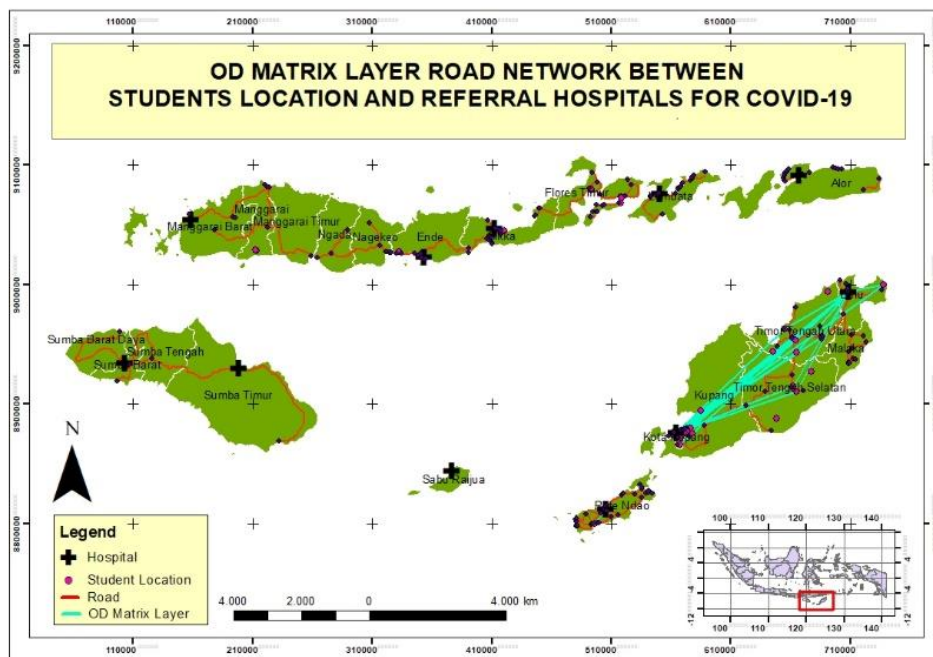layout then was made, the results are as follows:

Figure 4. OD Matrix Layer

From the results of the OD Matrix Layer analysis, it was observed that not all students could reach the Covid-19 referral hospitals. The hospital rankings, ranked by the highest destinations could also be observed. The data were then arranged based on the results of the OD Matrix Layer analysis with the results below:

Table 3. Destination Rank

Name	Destination Rank
RSUD WZ. Yohanes Kupang	1
RSUD Komodo, Labuan Bajo	2
RSUD Ende	3
RSUD Lewoleba, Lembata	4
RSUD Alor	5
RSUD T.C. Hillers Maumere	6
RSUD Gabriel Manek, Belu	7
RSUD Ba'a Rote Ndao	8
RSUD Sabu Raijua	9
RSUD Waikabubak Sumba Barat	10
RSUD Umbu Rara Meha Waingapu	11

Source: Data Analysis, 2020

In Table 3 observed that WZ. Yohanes Hospital in Kupang City was the most accessible Covid-19 referral hospital for students. From the OD Matrix Layer analysis, Not of all student locations could reach the hospital location, as seen in the Table 4.

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Table 4. Information of the Affordability Covid-19 Referral Hospitals to Student Locations.

Information	Amount	Percentage (%)
Located	59	67,82
Unlocated	28	38,18

Source: Data analysis, 2020

Table 4 showed the results of the OD Matrix Layer analysis, that there were 59 students or 67.82 % whose locations could reach Covid-19 referral hospitals. Meanwhile, 28 students or 38.18% were unable to reach Covid-19 referral hospitals. This could threaten the student's condition if the student was then exposed to Covid-19 disease. From the analysis of OD Matrix Layer, the distance taken from a student to a referral hospital Covid-19 nearby could be observed as follows:

Table 5. The Distance of Student Location from the Nearest Covid-19 Reference Hospital

Information	Amount	Percentage (%)
Less than 15 km	35	40,22
15 - 30 km	11	12,64
More than 30 km	13	14,96
Unlocated	28	32,18

Source: Data analysis, 2020

Based on table 5, it could be seen that 35 students or 40.22% of their locations were less than 15 km from the location of the nearest Covid-19 referral hospital. With a distance of 15-30 km, there were 11 students or 12.64%, while more than 30 km, 13 students or 14.96% were observed.

Main Obstacle to Hospital Affordability

The obstacle to hospital affordability based on the results of student survey are as follows:

Table 6. The Main Obstacle to Hospital Affordability

Information	Amount	Percentage (%)
Facilities (ex:Transportation and road conditions)	30	34,48
geographic factors (ex : distance, slope and disaster-prone areas)	57	65,52

Source: Data analysis, 2020

Based on table 6, it could be seen the main obstacle to hospital affordability was geographic factor. East Nusa Tenggara province is in the form of an archipelago,

although mean of transportation is available but the main transportation is ship. The Ship schedule which did not cover all the time (less than 24 hours ship schedule) could complicate the students in obtaining health services from the referral hospital.

Solution

Associated with the condition of East Nusa Tenggara province in the form of islands, the government could strengthen the role of community health centers such as puskesmas.

D. CONCLUSIONS

Not all student locations could reach the location of the Covid-19 referral hospital. Only 59 students or 67.82%, which could be covered by the hospital. Meanwhile, 28 students or 32.18% could not reach the hospital. Based on the results of the OD Matrix Layer analysis it was known that WZ. Yohanes Hospital in Kupang City was the most reachable Covid-19 referral hospital from student locations. The government policy to make WZ. Yohanes Hospital as the main Covid-19 referral hospital in East Nusa Tenggara Province was right. Amount of 40.22% of locations of the students were less than 15 km from the nearby location of a Covid-19 referral hospital. Geographic factor was

the main obstacle to hospital affordability. Government could strengthen the role of community health centers such as "puskesmas" since it is the health service center that is closest to the people.

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